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Docket Number.

2691/2

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

INVENTOR(S)/APPLICANT(S)					
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FREDY	ORNATH	TEL AVIV, ISRAEL			
<input type="checkbox"/> Additional inventors are being named on page 2 attached hereto					
TITLE OF THE INVENTION (280 characters max)					
DEVICE FOR COLLECTING FROM A SCREENED OBJECT					
CORRESPONDENCE ADDRESS					
Direct all correspondence to:					
<input type="checkbox"/> Customer Number			Place Customer Number Bar Code Label here		
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ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification	Number of Pages	10	Applicant is Small Entity		
<input type="checkbox"/> Drawing(s)	Number of Sheets		<input type="checkbox"/> Other (specify)		
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)					
<input type="checkbox"/> A check or money order is enclosed to cover the filing fees					FILING FEE AMOUNT
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government					
<input checked="" type="checkbox"/> No.					
<input type="checkbox"/> Yes, the name of the U S Government agency and the Government contract number are.					

Respectfully submitted,

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USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, DC 20231

CarrySafe Device Description

1 Introduction

1.1 Scope

The described device is a device for collecting trace samples from the outside and inner surfaces of a screened object.

The traces are then transported (carried) by a collector that collects this sample. The collected sample is forwarded to an analyzer to find specific substances and evaluate present quantities.

1.2 Intended use of device

The device can be used for finding explosive, drugs or other illicit substances in luggage and cargo as well as to find pests, pesticides, toxin contamination in agricultural produce, and other applications.

1.3 How it works (see also detailed description of system)

The objects are placed on the table on which the lower part of the cloak (mantle) is previously deployed (spread-out) (this can also be part of the table surface).

The second part of the mantle is then placed (automatically) over the object to cover it completely in such a way that the outer part (rim) of the upper and lower mantles are superposed, forming a closed volume.

Then, air is pumped out to obtain a hermetic closure under atmospheric pressure or an overpressure can be applied to obtain this closure around the rim of the mantle.

Air is blowed/puffed out through the puffing orifices and is sucked through the suction orifices in the mantle (See mantle structure above).

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2 Detailed Description of the device and its operation

2.1 Device Description

The diagram illustrates a mechanical system with the following components and flow paths:

- Component 1:** A vertical rectangular block on the left side.
- Component 2:** A horizontal rectangular block at the top center.
- Component 3:** A vertical rectangular block on the right side.
- Component 4:** A horizontal rectangular block at the bottom center.
- Component 5:** A horizontal rectangular block on the far right.
- Component 6:** A horizontal rectangular block on the far left.
- Component 7:** A horizontal rectangular block at the top right.
- Component 8:** A horizontal rectangular block at the bottom right.
- Component 9:** A horizontal rectangular block at the top left.
- Component 10:** A horizontal rectangular block at the bottom left.

Flow paths are indicated by arrows and numbered circles:

- Flow from Component 1 to Component 2 (labeled 1).
- Flow from Component 2 to Component 3 (labeled 2).
- Flow from Component 3 to Component 4 (labeled 3).
- Flow from Component 4 to Component 5 (labeled 4).
- Flow from Component 5 to Component 6 (labeled 5).
- Flow from Component 6 to Component 7 (labeled 6).
- Flow from Component 7 to Component 8 (labeled 7).
- Flow from Component 8 to Component 9 (labeled 8).
- Flow from Component 9 to Component 10 (labeled 9).
- Flow from Component 10 to Component 1 (labeled 10).

2.1.1 Main (figure 1)

Air piping (5) and valves for air

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Collector (6)
Controller (7)
Electrical wiring (8)

2.1.2 Optional

Sensors (9)
Liquid pump for decontamination (10)
Liquid piping (11)
Over-pressurizing enclosure (12)
Heater (13) (Blower or air piping can pass through heater, or compressor can use hot air).

2.1.3 Mantle Structure (figure 2)

The mantle is made from flexible material such as latex (14). It contains two sets of tubes that make two interconnected, but separated networks: air supply and collection piping.

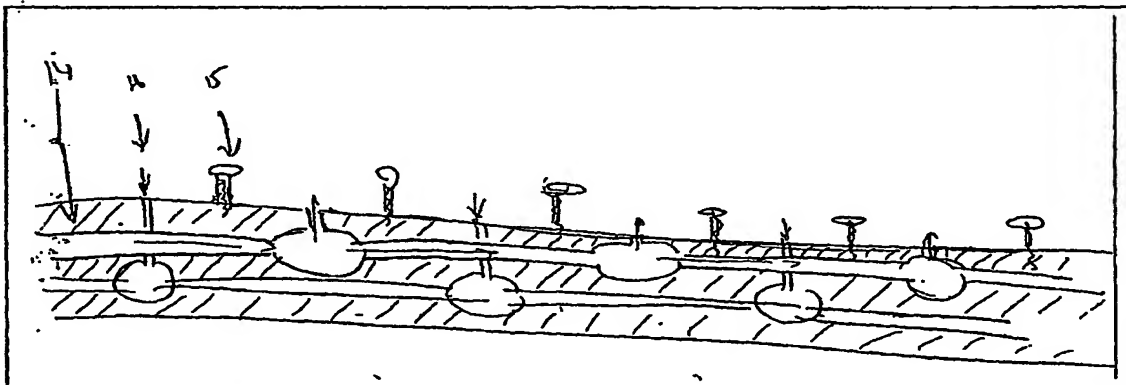


Figure 2: generalized mantle structure.

- a) Interconnected Suction network: pipes and tubes that conduct the air that were brought in by low pressure, through the suction orifices. The air is collected by the tubes.
- b) Pressurizing network: interconnected pipes and tubes that conduct higher pressured air towards the puffing (blowing) orifices (16).

c) The mantle is suspended at a small distance from the screened object surfaces by small feet or bumps (protrusions) (15). These need to be located in particular around the suction orifices to avoid air flow obstruction. At the pressurizing orifices the location of spacers is optional, since higher pressure will keep these orifices open when needed.

2.2 Optional operational variations

- i) lateral local air flow can be obtained by using valves that puff the air through side orifices in a certain order (such as rotating).
- ii) sucking the air in selected groups of orifices in a certain order. Peristaltic motion can allow directional air displacement and evacuation in a specific direction.
- iii) evacuation of the puffed air can be done through one or more tubes that are connected.
- iv) the flow of air can be effected by introducing air at one or more locations through tube (5), without using the described distributor orifices, and evaluating the air through the described suction orifices or the evacuation tubes.
- v) hot air can be used.
- vi) the air can be made to pulsate by low frequency sound or by using some pulsed valves.
- vii) squeezing: the mantle can be made to squeeze air out of the objects by increasing the applied pressure.
- viii) compression and decompression can be effected by using controlled pressures. This may improve the air efficiency and carry-on particles from inside the luggage.

2.3 Sample collection

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The evacuated air is passed through a collection device that may comprise of a paper filter, or other type of collector that gathers the particles and the substances that are carried in by the air.

The collected sample vapor and particles are then transferred to an analyzer that can detect the type of substance and their respective quantities.

Use of a scrubber type collector is suggested to separate the soluble gas and particles from other particulates such as dust, and also to feed the analyzer with a continuous (or discrete) liquid flow of collected substance.

3 System Advantages and Improvement over state of the art

While most trace detection screening is done manually, a few types of automatic/mechanized screening systems are under development to effect automatic screening: open and closed systems.

3.1 Advantages of this system

Since this is a closed system, pressure differences can be used to effectively handle a small quantity of air to dislodge trace particles and entrain them to be carried towards the collection system.

In particular, heat, pulsing, jetting, etc. can be used to lift the traces from the surface, and decompression can effectively bring out air from within the screened enclosures that are usually not hermetically closed.

The system adapts itself to the form and size of the inspected item, keeping the process volume to the minimum, and bringing the system to close proximity of the inspected surface. This can minimize the energy needed for process operation, optimize the effectiveness of the pneumatic process of flow, trace lifting, trace carrying, etc. Large flow velocities can be obtained with small air quantities.

3.2 Closed systems

Other equipment exists that allows the screened objects to be placed in a closed enclosure and the air is sucked out to allow subsequent analysis. Some of them are subject of US Patent 5,942,699 by Ornath et al, 1999.

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Heat, vibration, compression and decompression, continuous or cyclic are used to effect the dislodging of particles and their transport towards the collector.

However, all these devices use a rigid enclosures such as a box, pressure vessels, etc., to contain the pressure differences between inside and outside. There are many patents that involve such configuration. These have some inherent drawbacks:

i) large process volume

The difference in volume between the objects to be checked / inspected / screened and the rigid enclosure is filled with a large quantity of air that has also to be passed through the filters, but contains no relevant information (trace material).

This large quantity of air requires a suitable size of equipment for treating and separating the traces and also increases the process cycle time. The size of the chamber is tailored to the largest object that needs to be inspected and has additional volume due to engineering considerations (a round cylindrical vessel is easier to produce than other forms).

- ii) large volume increases the size and the cost of the equipment and makes it impractical in crowded areas. This also influences the cost of the main chamber, of the ancillary equipment, and increases the footprint of the inspection station.
- iii) there is a large distance between the surfaces to be sampled and the collection exhaust piping. This increases the trace material that is lost when the particles settle on their way out.

The proposed method uses a flexible mantle/cloak that receives the form of the objects and therefore minimizes the (parasitic, ballast) air quantity to be processed (screened, pumped pressurized, sucked).

The use of a small quantity of air improves the efficiency of the system by decreasing cycle time, decreasing equipment needs, increasing the signal to noise ratio.

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The distance between the surface to be sampled and the blowing orifices and between this surface and the collection orifices is minimized therefore increasing the operation effectiveness.

The short distance to the surface allows the formation of jets that are the most effective means to dislodge trace particles from the surface.

3.3 Open systems

Open systems for luggage screening that simulate the operation of portals for personnel screening are under development (and patented). Such systems look simple to integrate with the baggage flow and carry the promise of fast and inexpensive screening.

However, such systems are limited in effectiveness because of certain features:

- i) without overpressure and decompression there is no practical chance to sample the inner volume of the screened objects, since these can be realized only in closed systems that can contain the pressure differences.
- ii) The air volume that needs to be collected and processed is very large. This may decrease the signal to noise ratio by entraining unwanted traces that may be existent in the surrounding air space. Since in many cases only part of the air can be processed, some of the traces are lost, decreasing the sensitivity.
- iii) There is no easy way to use impingement by directional air flow to improve collection effectiveness, even though that is practically the best way to lift the traces from the surface. Traces may also be lost due to deflected air flow.
- iv) There is no practical way to collect traces from the proximity of the surface.

The proposed system is flexible and has the advantages of the open systems from the point of view of the size and integrability with the

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luggage flow. It may be marginally more expensive than open systems but this difference is offset by obtaining better efficiency.

3.4 Other advantages

3.4.1 Better sensitivity

Closed systems are expected to achieve better screening capabilities that are comparable with explosive detection equipment that is already deployed in airports at a much lower price. The acceptance of automatic trace detection systems in such role, will increase considerably the deployment of trace detection analyzers.

3.4.2 Patentability

Because of its unique structure the device can be patented to obtain some protection of the knowhow.

4 Decontamination

A decontamination device is optional to clean the system periodically and after contamination with the sought species, either during operation or testing.

Such system may comprise a pump that pumps liquid detergent or solvent that is distributed through a distributor that simulates a screened object of the largest size.

The liquid is sprayed on the mantle and then is collected and drained.

5 Controller

The system is automatically operated under a computerized system manager.

Decision regarding detection of suspect substance and alarm is automatic and does not involve human intervention.

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An essentially electronic controller is optionally used to coordinate the operation cycle of the different parts of the system.

Sensors for physical entities such as temperature, pressure, location, timing can be used in the system to optimize its functions and increase reliability.

6 Other options

6.1 The mantle can be operated laterally from two sides.

6.2 The mantle parts can be made into one, and the objects could be rolled inside the mantle. (figure 3)

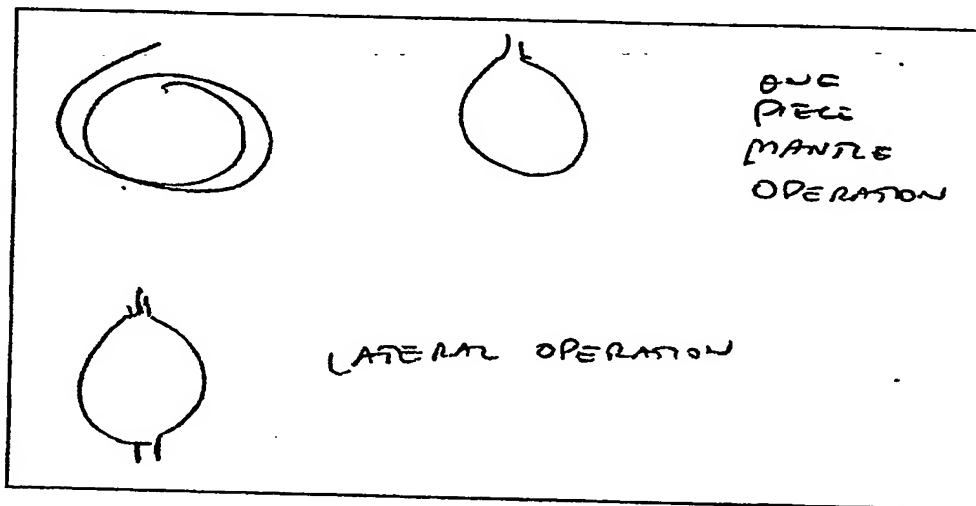


Figure 3: other mantle operation modes.

7 Figures

Figure 1: General visualization of the system: see numbers in text.

Figure 2: generalized mantle structure.

Figure 3: other mantle operation modes.

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I claim:

1. One or more aspects of device for collecting from a screened object substantially as described herein.

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